

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Efron in view of Smith (US 5,945,932).

Applicants respectfully traverse these rejections in view of the following comments.

Discussion of Request for Examiner Interview and Interview Summary

Applicants' counsel requested an interview with the Examiner in February of 2005 to discuss the final Office Action and the Efron reference. The Examiner refused to grant an interview, since a final Office Action had been issued. Applicants' counsel requested that the Examiner review the request for an interview with her supervisor, and briefly reviewed the differences between the signature of Efron and the watermark of Applicants' claimed invention.

The Examiner reviewed the interview request with her supervisor and telephoned Applicants' counsel on March 3, 2005 to indicate that she had been instructed by her supervisor to undertake a further search of the prior art and that she would call back after conducting this search.

On March 29, 2005, the Examiner telephoned and informed Applicants' counsel that a written response to the final Office Action must now be filed before a further search of the prior art could be undertaken. The Examiner indicated that she understood the differences between the Efron reference and Applicants' claimed invention, but would not agree to withdraw the final Office Action or the Efron reference.

On March 30, 2005 Applicants' counsel reviewed this matter with the Examiner's Supervisor, Kim Vu in a telephone conference. Supervisor Vu indicated that, despite the previous agreement that the Examiner would undertake a further search, a written response to the final Office Action was now required before such a search could occur. Applicants' counsel suggested that the Examiner could simply enter an Interview Summary indicating that agreement had been reached and withdrawing the final Office Action, so that the time limit for responding would no longer be pending, thereby allowing the Examiner to conduct a further search. Supervisor Vu did not agree to this suggestion, and indicated that Applicants' counsel should file a brief written response to

the final Office Action to meet the pending deadline, so that immediate action would be required by the Examiner in considering the response.

The foregoing description is provided as Applicants' summary of the foregoing telephone conferences, to the extent that the foregoing telephone conversations are treated as formal interviews by the Examiner or her supervisor.

Discussion of Efron

Efron discloses a technique for analyzing signal transferring characteristics of a signal processing unit such as a recording medium, amplifier, circuit board, or the like. Evaluation of the signal processing unit is accomplished by establishing an input signal of known content, measuring selected parameters of selected parts of the input signal, feeding the input signal to the unit under test, measuring the parameters of parts of the output signal from the unit under test corresponding to the same selected parts of the input signal, and comparing the selected parts of the input signal with the selected parts of the output signal (Col. 7, lines 17-27). The parameters of the signal are referred to in Efron as a "signature" (Col. 8, lines 7-19).

As discussed with the Examiner, the teachings of Efron are far removed from the field of watermarking. In fact, there is no disclosure or suggestion of watermarking in Efron. A search of Efron indicates that the term "watermark" does not even appear in the specification of Efron.

The term "watermark" is well known in the art and is defined as a substantially imperceptible signal which is added to a host signal (see, e.g., Applicants' specification, page 11, lines 15-25). The Examiner is also referred to the definition of "watermark" from wedopedia.com attached to Applicants' Response to the previous Office Action filed on July 6, 2004. Accordingly, the watermark claimed by Applicants is additional information (i.e., an auxiliary signal) which is added to the host signal by embedding it in the host signal.

In contrast, the "signature" of Efron is made up of existing parameters of the signal which are obtained by measuring parameters of the signal. Efron discloses that the signature is comprised of a multiplicity of test parameters of the signal (Efron, Col. 8,

lines 10-11). These parameters (i.e., the signature) may be produced, for example, by performing a large number of audio and video measurements on the unit under test (Efron, Col. 8, line 23-25). Thus according to Efron, this signature is not additional information which is embedded (i.e., added imperceptibly) to the host signal, as with Applicants' claimed invention. Rather, the parameters that make up Efron's signature are qualities which are inherently present in the signal and do not comprise additional information equivalent to an embedded watermark as claimed by Applicants.

In addition, the parameters that make up the signature of Efron are measured from the signal without altering (i.e., adding to) the content or the signal carrying the content. The signature in Efron is derived by analyzing the test signal and program material (Col. 9, lines 58-59). For example, to derive the signature of Efron, audio spectrums may be obtained at intervals throughout the active program area and data so obtained becomes part of the signature (Col. 10, lines 28-30). Therefore, the signature of Efron is content dependent and different content will necessarily have different signatures. This process cannot be equated to the watermarking claimed by Applicants, wherein additional information is embedded in the signal, thereby altering it in a substantially imperceptible manner. The information carried within the watermarks are not required to be related to or to be derived from the host signal, as is the signature of Efron. A watermark comprises additional data which is embedded into the signal, and each content signal can therefore carry the same watermark if desired.

Further, Efron does not disclose or remotely suggest the concept of forming a steganographic signal as claimed by Applicant. Steganography is defined as: "Hiding a secret message within a larger one in such a way that others cannot discern the presence or contents of the hidden message (The Examiner is referred to the printout from dictionary.com attached to Applicants' Response filed on July 6, 2004). Therefore, a steganographic signal is one in which a message is hidden in such a way that its presence and/or content cannot be discerned (See e.g., Applicants' specification, page 11, lines 15-26). Efron does not disclose or remotely suggest the formation of a steganographic signal as claimed by Applicants.

In the Response to Arguments section on page 2 of the final Office Action, the Examiner indicates that:

"The signature represents the watermark signal in functionality, in light of the claimed limitation. The degree of degradation of the signal is evaluated by measuring the deterioration of the signature (watermark) after the signal undergoes processing (such as replication in Efron, column 7, lines 38-48). Hence, Efron sufficiently meets the claimed limitation".

(Office Action, Page 2).

Applicants' respectfully submit that the Examiner has incorrectly interpreted either the disclosure of Efron or Applicants' claim language. With Applicants' claim 1, the deterioration of the embedded watermark is measured in order to estimate the nature and/or amount of processing that has been applied to the signal. In Efron, degradation of a signature (i.e., a multiplicity of test parameters collected during the recording/playback of the signal) is measured in order to evaluate a signal processing unit.

Accordingly, the claimed invention and Efron are measuring two different things (i.e., watermark deterioration and signature degradation) for two different reasons (i.e., to estimate the amount/nature of processing applied to a signal and to evaluate a signal processing unit). Therefore, the signature of Efron and Applicants' claimed watermark cannot be said to be functionally equivalent, as is apparently asserted by the Examiner.

Further, the Examiner indicates on page 3 of the final Office Action that:

"The signature of the reference represents a watermark because of the reasons also set forth above; and it is stored within a signal that undergoes processing, after which the amount of processing is determined by the evaluation of the embedded signature".

(Office Action, page 3).

The Examiner is incorrect in asserting that the "signature" of Efron is stored within a signal. Efron very clearly indicates that the signature is derived from existing parameters which are inherent to the signal, such as the frequency spectrum of the signal (Col. 23, lines 27-41), whether the signal is monophonic or non-monophonic (Col. 23,

lines 46-49), and measured signal noise (Col. 30, lines 1-5). These are not parameters that are “stored” in the signal as apparently assumed by the Examiner, but rather measurable attributes or features of the signal. Further, as discussed above, the purpose of measuring the degradation of the signature in Efron is for evaluation of a signal processing unit, and not to estimate the amount or nature of processing applied to a signal as claimed by Applicants.

In Efron, the measured parameters of the original signal are stored in signature store 168 for use as a reference signature. Measured parameters of the output signal of the unit under test are stored in signature store 231 and compared to the reference signature stored in signature store 168 by the comparator 171 (Col. 39, lines 33-48; Figures 25-27). Accordingly, this process of Efron requires knowledge of the original reference signature for comparison to the signature of the signal output from the unit under test. In contrast, with the present invention, it is the deterioration of the embedded watermark that enables the determination of the nature and/or extent of processing applied to the signal. With Applicants’ claimed invention, there is no need to compare original input parameters (reference signature) of the signal with measured output parameters (signature of signal output from unit under test) as in Efron; the estimation of the nature and/or amount of processing can be accomplished blindly (i.e., without knowledge of the input content). In contrast, Efron requires knowledge of the original signal (i.e., measured parameters of the original signature) in order to determine degradation of the signal. The degree of redundancy of the embedded watermark of the present invention enables recovery of the watermark from the processed signal. For example, the watermark information (e.g., represented by a plurality of data bits) may be repeated hundreds of times. Even if a high percentage of these data bits may be destroyed through processing of the signal, it is still possible to reliably recover data bits making up the watermark from the processed signal, due to the high degree of redundancy of the data bits in the original signal. Once the data bits of the original watermark are recovered, the estimation of the processing can be made based on the percentage of incorrect bits in the raw data stream comprising the watermark and deriving a bit-error-rate measurement (BER) therefrom (see, e.g.,

Applicants' specification, page 14, lines 10-23). This information can be used to estimate the nature and/or amount of processing applied to the signal.

In sum, the Examiner's rejections of Applicants' claims are based on an erroneous assumption that the claimed watermark is equivalent to the signature disclosed in Efron. As discussed above in detail, the disclosure of Efron is not even remotely concerned with the concepts of watermarking or the formation of a steganographic signal. Therefore, Efron does not disclose or suggest the following features of Applicants' independent claims 1 and 22:

- Embedding a watermark into a signal;
- Embedding the watermark into the signal with a degree of redundancy;
- Embedding the watermark into the signal to form a steganographic signal;
- Measuring deterioration of the embedded watermark in the steganographic signal after the steganographic signal undergoes processing; and
- Estimating the nature and/or amount of processing based on the measured deterioration of the watermark.

In view of the above, Applicants respectfully submit that the present invention would not have been obvious to one skilled in the art in view of Efron, taken alone or in combination with Shimpuku or Smith, or any of the other prior art of record.

Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicants' silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections under 35 U.S.C. § 103(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any

remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,



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